OBG

FINAL REPORT

Corrective Measures Study Interim Report
EW-7S and EW-8D Pilot Test Results

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Corrective Measures Study Interim Report EW-7S and EW-8D Pilot Test Results

Evendale, Ohio

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1. INTRODUCTION

General Electric Company (GE) currently operates a RCRA Interim Remedial Measure (IRM) groundwater extraction system (GWES) at the southern end of the GE Aviation facility (Facility) located in Evendale, Ohio (Figure 1). This Interim Report summarizes the results of a pilot test conducted to evaluate whether continued pumping of extraction wells EW-7S and EW-8D is beneficial to the effectiveness of the IRM GWES. The basis for the pilot testing efforts were originally outlined in the *Corrective Measures Study (CMS) Work Plan* (OBG, 2014), with initial data analysis and plans for testing provided in the *CMS Interim Report – Performance Monitoring Update and Pilot Test Plan* (OBG, 2015), herein referred to as the PT Work Plan. The methods utilized, findings, and conclusions and recommendations resulting from the pilot testing are presented.

1.1 BACKGROUND

The GE Aviation facility is located on an approximately 400-acre site in southwestern Ohio's Hamilton County, approximately ten miles north of Cincinnati. The Facility is a secure, highly active, long-term manufacturing facility located within the heavily industrialized I-75 corridor between Cincinnati and Evendale, Ohio. The Facility has been used for military and commercial aircraft engine manufacturing and testing since the 1940s.

In 2009, a groundwater IRM was initiated to address off-site migration of chlorinated volatile organic compounds (CVOCs) in the southern (downgradient) portion of the Facility within the area of former AFP36 (OBG, 2009). The groundwater IRM was initiated with the objective of mitigating off-site migration of compounds of potential concern (COPCs), while minimizing the risk of cross-contamination and/or reducing the effectiveness of biodegradation processes. The groundwater IRM includes seven groundwater extraction wells and a groundwater treatment plant (GWTP). The GWTP was started on July 11, 2011, following construction and commissioning of the system (OBG, 2011). Groundwater monitoring activities, including baseline and performance monitoring, have been conducted since startup in accordance with the approach and methods outlined in the *IRM Performance Monitoring Plan* (PMP)(OBG, 2010).

As discussed in the CMS Work Plan and PT Work Plan, a diminished well specific capacity and pumping rate at EW-7S, as well as the influence of EW-8D pumping on vertical hydraulic gradients, provided a basis for conducting the pilot test to examine the planned shutdown of extraction wells EW-7S and EW-8D. This is supported by the results of quarterly statistical analyses of GWTP influent concentrations that suggest an evaluation of continued pumping/system optimization could be conducted as part of the PMP and DQO process. Depending on the timing and approval of long-term media cleanup objectives, existing concentrations may indicate that continuous pumping from these wells can be discontinued and replaced with long-term monitored natural attenuation (MNA).

1.2 OBJECTIVES

An objective of the pilot test was to evaluate whether pulsed pumping of EW-7S would improve the overall pumping effectiveness within the upper sand and gravel unit (USG). An additional objective was to evaluate the advantages/disadvantages of shutting down EW-7S and EW-8D, particularly with respect to the potential for rebound or vertical cross-contamination from the USG to the lower sand and gravel unit (LSG).

2.0 TECHNICAL APPROACH

The technical approach used to meet pilot test objectives for EW-7S and EW-8D are noted in Figures 2 through 9 and described below:

2.1 EW-7S

- The pilot test was initiated on August 10, 2015. EW-7S was cycled off and then on at 3.5 day intervals for the first 2 weeks of the pilot test (*i.e.*, for two consecutive one-week long cycles) to evaluate potential improvement in the well specific capacity following the off cycling.
- EW-7S was then turned off for 2 weeks beginning on August 24, 2015 and then turned back on for 1 week (*i.e.*, three-week long cycle) for two consecutive cycles ending on October 6, 2015.
- EW-7S was turned off on October 6, 2015 for 8 weeks to evaluate whether its shutdown had a noticeable effect on the LSG and EW-8D. On December 1, 2015 the well was turned on and allowed to operate through December 11, 2015 (10 days) and then was turned off until February 17, 2016 (approximately 10 weeks) when the pilot test was terminated. EW-7S was restarted for short periods of time on January 14, 2016 and February 9, 2016 for sampling and then shut down.

2.2 EW-8D

- EW-8D was initially cycled on and off with EW-7S until September 8, 2015, when it was turned on and left on until December 11, 2015 (approximately 13 weeks).
- Following cycling of EW-7S, EW-7S remained shut down, and a shutdown test for EW-8D was initiated on December 11, 2015 for a 5-week period until January 14, 2016. Well EW-8D was then turned on until February 9, 2016 when it was shut down until February 17, 2016. The pilot test was terminated earlier than proposed in the PT Work Plan on February 17, 2016 due to the low operational flow rate of the GWES. Low operational flow occurred particularly during the extended shutdown of EW-8D, impacting the treatment effectiveness of the air stripper unit.

2.3 GROUNDWATER QUALITY AND HYDRAULIC MONITORING

- Effluent samples from EW-7S and EW-8D were collected prior to each shutdown and within approximately 15 minutes of each startup (to evacuate any stagnant water in the extraction well and piping) to evaluate the effect of the sequence of shutdowns on the effluent concentrations.
- Groundwater samples from groundwater monitoring wells AF-11S/D and OSMW-4S/D were collected utilizing low flow sampling techniques prior to each extraction well shutdown and restart.
- The hydraulic data collected by existing transducers in monitoring wells AF-11S/D and OSMW-4S/D were downloaded at a frequent basis during the pilot testing to evaluate the data more frequently than outlined in the PMP.

Data evaluation and pilot test results are presented in Section 3.

3. PILOT TEST EVALUATION

A summary of the observations and evaluation of the results obtained during the pilot test is provided. Groundwater levels monitored during the pilot testing are presented in Figures 2 and 3. Groundwater quality data collected from extraction well effluent and monitoring wells during pilot testing are summarized in Tables 1 through 3 and presented graphically in Figures 4 through 9.

3.1 GENERAL PILOT TEST OBSERVATIONS

The following general observations were made during the pilot test:

- Both the AF-11S/D well series and OSMW-4S/D well series showed a larger response in water levels to the first off cycle of EW-7S and EW-8D; the responses were more subdued and not as significant thereafter (see Figures 2 and 3). Possible causes for this may be the length of pumping cycle and, for the USG hydraulic response, variable recharge and permeability influence.
- Both the USG and LSG wells indicate groundwater level recovery after EW-7S was turned off on September 15, 2015 (while EW-8D continued pumping) confirming the hydraulic communication between the USG and LSG.
- Pumping EW-7S at current low extraction rates of approximately 10 gpm helps to reduce the magnitude of the downward vertical gradients. However, as noted in the PT Work Plan, the "break-even" pumping rate is approximately 20 gpm, below which the vertical hydraulic gradient reverts back to downward (with EW-8D pumping at 50 gpm).
- No increases in downgradient CVOC concentrations were observed during quarterly IRM monitoring in offsite monitoring well OSMW-9S within the USG or OSMW-9D within the LSG during the pilot test (see historical CVOC concentration graphs provided in Appendix A).

3.2 EW-7S PILOT TEST RESULTS

The following summarizes the results observed during the pilot test with regard to pumping of EW-7S:

- The specific capacity (pumping rate/total drawdown) of EW-7S did not improve due to the cycling of EW-7S. Although the "relative" well capacity (pumping rate/drawdown experienced during pumping cycle) did improve, it is the overall specific capacity that drives the efficiency of the extraction system.
- **Monitoring Well AF-11S** - No significant change in the low CVOC concentrations due to the cycling of pumping (*i.e.*, no rebound) was observed (see Figure 4).
- **Monitoring Well OSMW-4S** - No significant change in CVOC concentrations due to the cycling of pumping (*i.e.*, no rebound) was observed (see Figure 5). It is noted that concentrations generally spike seasonally in the 3rd/4th quarter of each year (Appendix B).
- **Extraction Well EW-7S** - A cyclical pattern of higher concentrations in EW-7S just before each shut down, with lower concentrations on each startup, was observed (Figure 6). This pattern would indicate that concentrations in the immediate capture area of EW-7S have been substantially reduced.
- Concentrations in OSMW-4S are much lower than historical monitoring well data and synoptic EW-7S concentrations. Because no rebound was observed during the longer 8- and then 10-week shutdown periods, the preliminary pilot test results indicate that concentrations in the area adjacent to EW-7S have been substantially reduced.
- The mass removal rate for EW-7S prior to the pilot test was greater than after the start of the pilot test because of the cycling of EW-7S (see Figure 6 which shows decreased CVOC concentrations during each "off" cycle of EW-7S).

3.3 EW-8D PILOT TEST RESULTS

The following summarizes the results observed during the pilot test with regard to pumping of EW-8D:

- **Monitoring Well AF-11D** - No significant change in concentrations due to the cycling of pumping (*i.e.*, no rebound) was observed (see Figure 7). Concentrations remained consistently low, and concentrations have remained below MCLs for at least the last year. The pilot test results do not indicate cross-contamination from USG (Figure 7); and preliminary results indicate that concentrations near this area of the LSG have been substantially reduced.
- **Monitoring Well OSMW-4D** - No significant change in concentrations due to the cycling of pumping (*i.e.*, no rebound) was observed (see Figure 8). The pilot test results do not indicate cross-contamination from the USG. Although concentrations have decreased with time, OSMW-4D concentrations are still generally higher than EW-8D (see Figure 9).
- **Extraction Well EW-8D -** CVOC concentrations in EW-8D (Figure 9) remain low and near MCLs, and data do not indicate cross-contamination from the USG.
- The mass removal rate in EW-8D prior to the pilot test is approximately equal to the rate after the start of the pilot test (see Figure 9 which shows relatively steady CVOC concentrations regardless of the "on-off" cycle of EW-8D).

4. SUMMARY AND CONCLUSIONS

The following summary highlights the results of the EW-7S/EW-8D pilot test evaluation at the GE Evendale Facility:

- Groundwater level monitoring during the pilot test confirms the hydraulic communication between the USG and LSG.
- Continued pumping of EW-7S at extraction rates of less than approximately 20 gpm, while helping to reduce the magnitude of the downward vertical hydraulic gradients, is insufficient in reversing the downward vertical hydraulic gradient caused by continued pumping of EW-8D.
- The specific capacity (pumping rate/total drawdown) of EW-7S did not improve due to cycling of EW-7S.
- The mass removal rate in EW-7S prior to the pilot test was greater than during the pilot test because of the cycling of EW-7S. The mass removal rate in EW-8D prior to the pilot test was approximately equal to the rate after the start of the test.
- Groundwater quality data did not indicate cross-contamination from the USG to the LSG during the pilot test.
- Groundwater quality downgradient of the pumping at EW-7S and EW-8D did not indicate rebound due to the cycling and/or shutdown of the extraction wells.

Due to hydraulic communication and natural vertical gradients between the USG and LSG, it is concluded that EW-8D should not be operated without the operation of EW-7S. In addition, the pilot test results indicate that the shutdown of both EW-7S and EW-8D would be appropriate and continue to meet the overall objective of the IRM based on the following:

- The low extraction rate (<20 gpm) of EW-7S and inability to reverse the downward hydraulic gradient,
- The substantial reduction in groundwater CVOC concentrations in the immediate capture area of EW-7S within this area of the USG, and
- The substantial reduction in groundwater concentrations in the immediate capture area of EW-8D, indicated by existing low (near MCL) CVOC concentrations in this area of the LSG.

As a result of the pilot study and analyses, GE proposes to proceed with the following (pending USEPA approval):

- Establish groundwater corrective measures objectives (CMOs) to guide the transition from active pumping to long-term MNA.
- Shut down both EW-7S and EW-8D and conduct a longer-term rebound evaluation to assess the effect on groundwater quality in the vicinity of EW-7S and EW-8D and off-site.

5. REFERENCES

OBG, 2010. IRM Performance Monitoring Plan. GE Aviation, Evendale, Ohio. December 2010.

OBG, 2011. Groundwater IRM, Quarterly Groundwater Monitoring Report – 3rd Quarter 2011. GE Aviation, Evendale, Ohio. January 2012.

OBG, 2014. Corrective Measures Study Work Plan. GE Aviation, Evendale, Ohio. May 2014.

OBG, 2015. Corrective Measures Study – Interim Report: Performance Monitoring Update & Pilot Test Plan. GE Aviation, Evendale, Ohio. June 2015.

Tables

Table 1

GE OHD 000 817 312
GE Aviation_Evendale, Ohio - Groundwater IRM
Summary of AF-11S/D Pilot Test Groundwater Sampling Results - Detected Parameters Only

Constituent	Well ID: / Date:	AF-11D 8/11/2015	AF-11D 8/13/2015	AF-11D 8/17/2015	AF-11D 8/20/2015	AF-11D 8/24/2015	AF-11D 9/8/2015	AF-11D 9/15/2015	AF-11D 9/29/2015	AF-11D 10/6/2015	AF-11D 12/1/2015	AF-11D 1/14/2016	AF-11D 2/9/2016	AF-11D 3/2/2016
1,1-Dichloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chloroethane	ug/l	< 1	0.93	0.65	0.95	0.85	1	0.94	< 1	1.5	0.76	0.99	0.64	0.44
cis-1,2-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.95	1.9	1.5	1.7
Methylene Chloride	ug/l	< 1	< 1	< 1	0.45	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.96	1.1	0.91	0.98	1.1
TOTAL VOCs	ug/l	0	0.93	0.65	1.4	0.85	1	0.94	0	2.46	2.81	3.8	3.12	3.24
TOTAL CVOCs	**ug/l**	**0**	**0.93**	**0.65**	**0.95**	**0.85**	**1**	**0.94**	**0**	**2.46**	**2.81**	**3.8**	**3.12**	**3.24**

Table 1

GE OHD 000 817 312
GE Aviation_Evendale, Ohio - Groundwater IRM
Summary of AF-11S/D Pilot Test Groundwater Sampling Results - Detected Parameters Only

Constituent	Well ID: / Date:	AF-11S 8/11/2015	AF-11S 8/13/2015	AF-11S 8/17/2015	AF-11S 8/20/2015	AF-11S 8/24/2015	AF-11S 9/8/2015	AF-11S 9/15/2015	AF-11S 9/29/2015	AF-11S 10/6/2015	AF-11S 12/1/2015	AF-11S 1/14/2016	AF-11S 2/9/2016	AF-11S 3/2/2016
1,1-Dichloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	ug/l	< 10	14	7.4	< 10	< 10	4	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	1.2	1.3	1.2	0.97	< 1	1.8	1.1	0.99	0.82	0.93	0.9	0.94	<1
Methylene Chloride	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	ug/l	2.4	1.3	2.6	2.8	1.8	2.6	2.7	3.2	2.5	2.5	2.5	2.6	3
TOTAL VOCs	ug/l	3.6	16.6	11.2	3.77	1.8	8.4	3.8	4.19	3.32	3.43	3.4	3.54	3
TOTAL CVOCs	**ug/l**	**3.6**	**2.6**	**3.8**	**3.77**	**1.8**	**4.4**	**3.8**	**4.19**	**3.32**	**3.43**	**3.4**	**3.54**	**3**

Table 2

GE OHD 000 817 312
GE Aviation_Evendale, Ohio - Groundwater IRM
Summary of OSMW-4S/D Pilot Test Groundwater Sampling Results - Detected Parameters Only

	Well ID:	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D	OSMW-4D
Constituent	**Date:**	8/11/2015	8/13/2015	8/17/2015	8/20/2015	8/24/2015	9/8/2015	9/15/2015	9/29/2015	10/6/2015	12/1/2016	1/14/2016	2/9/2016	3/2/2016
1,1-Dichloroethane	ug/l	4.6	3.8	4.6	4.8	3.9	4.3	4.2	3.7	0.57	3.7	3.7	3.5	1.7
1,1-Dichloroethene	ug/l	< 1	< 1	0.39	0.35	0.31	0.33	< 1	< 1	< 1	0.3	0.32	< 1	< 1
Acetone	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	19
Chloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	10	9.1	11	11	8.9	9.3	10	9.3	2.3	8.2	8.1	6.7	1.1
Methylene Chloride	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	ug/l	19	9.4	19	21	15	17	17	15	2.6	17	16	18	3.3
TOTAL VOCs	ug/l	33.6	22.3	34.99	37.15	28.11	30.93	31.2	28	5.47	29.2	28.12	28.2	25.1
TOTAL CVOCs	**ug/l**	**33.6**	**22.3**	**34.99**	**37.15**	**28.11**	**30.93**	**31.2**	**28**	**5.47**	**29.2**	**28.12**	**28.2**	**6.1**

Table 2

GE OHD 000 817 312
GE Aviation_Evendale, Ohio - Groundwater IRM
Summary of OSMW-4S/D Pilot Test Groundwater Sampling Results - Detected Parameters Only

	Well ID:	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S	OSMW-4S
Constituent	**Date:**	8/11/2015	8/13/2015	8/17/2015	8/20/2015	8/24/2015	9/8/2015	9/15/2015	9/29/2015	10/6/2015	12/1/2015	1/14/2016	2/9/2016	3/2/2016
1,1-Dichloroethane	ug/l	< 1	< 1	0.57	0.58	0.47	0.6	0.56	0.47	4.4	0.53	<1	<1	<1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.33	< 1	< 1	< 1	< 1
Acetone	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	10	< 1	< 1	< 1	< 1
Methylene Chloride	ug/l	0.47	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	1.1	1.6	17	22	<1	1.5	<1
TOTAL VOCs	ug/l	0.47	0	0.57	0.58	0.47	0.6	1.66	2.07	31.73	22.53	0	1.5	0
TOTAL CVOCs	**ug/l**	**0**	**0**	**0.57**	**0.58**	**0.47**	**0.6**	**1.66**	**2.07**	**31.73**	**22.53**	**0**	**1.5**	**0**

Table 3

GE OHD 000 817 312
GE Aviation_Evendale, Ohio - Groundwater IRM
Summary of EW-7S and EW-8D Pilot Test Groundwater Sampling Results - Detected Parameters Only

	Well ID:	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S	EW-7S
Constituent	**Date:**	8/10/2015	8/13/2015	8/17/2015	8/20/2015	8/24/2015	9/8/2015	9/15/2015	9/29/2015	10/6/2015	12/1/2015	1/14/2016	2/9/2016	3/2/2016
1,1-Dichloroethane	ug/l	1.5	0.88	1.5	< 1	< 4	1	1.4	0.57	<1	<1	<1	<1	1.3
1,1-Dichloroethene	ug/l	< 4	< 1	0.56	< 1	< 4	< 1	0.51	< 1	< 1	< 1	< 1	< 1	0.49
Acetone	ug/l	< 40	3	< 10	< 10	< 40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chloroethane	ug/l	< 4	< 1	< 1	< 1	< 4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	190	28	170	8.4	210	12	180	29	200	<1	8.8	<1	250
Methylene Chloride	ug/l	< 4	< 1	< 1	< 1	< 4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	ug/l	< 4	< 1	< 1	< 1	< 4	1.4	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	ug/l	250	85	250	6.6	300	18	260	71	230	<1	7.9	4.7	360
TOTAL VOCs	ug/l	441.5	116.88	422.06	15	510	32.4	441.91	100.57	430	0	16.7	4.7	611.79
TOTAL CVOCs	**ug/l**	**441.5**	**113.88**	**422.06**	**15**	**510**	**32.4**	**441.91**	**100.57**	**430**	**0**	**16.7**	**4.7**	**611.79**

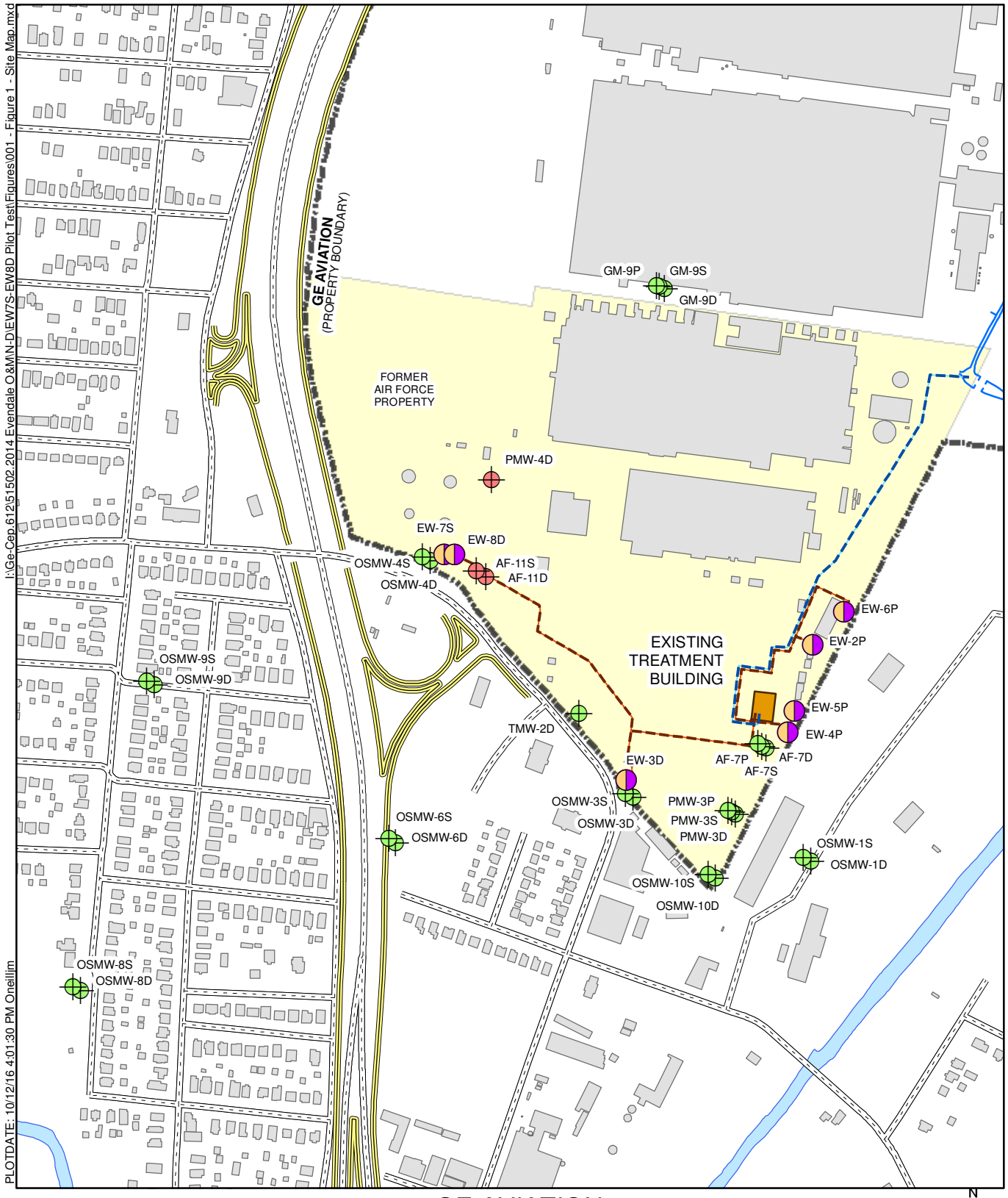
Table 3

GE OHD 000 817 312
GE Aviation_Evendale, Ohio - Groundwater IRM
Summary of EW-7S and EW-8D Pilot Test Groundwater Sampling Results - Detected Parameters Only

	Well ID:	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D	EW-8D
Constituent	**Date:**	8/10/2015	8/13/2015	8/17/2015	8/20/2015	8/24/2015	9/8/2015	9/15/2015	9/29/2015	10/6/2015	12/1/2015	1/14/2016	2/9/2016	2/9/2016
1,1-Dichloroethane	ug/l	1.1	1.4	1.3	1.3	1.3	1.1	1.3	1.3	<1	1.2	1	1	1.1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.37	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	4.6	5.2	4.9	5.2	4.9	10	5.2	5.1	5.4	5	6	4.5	4.7
Methylene Chloride	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	ug/l	1.8	2	2	2.1	1.8	1.3	2.1	2.2	2.1	1.9	2.5	1.9	2
Vinyl Chloride	ug/l	6	6.1	6.4	7.5	6.7	15	6.5	6.6	6.2	6.3	6	6	6.8
TOTAL VOCs	ug/l	13.5	14.7	14.6	16.1	14.7	27.4	15.1	15.2	13.7	14.77	15.5	13.4	14.6
TOTAL CVOCs	**ug/l**	**13.5**	**14.7**	**14.6**	**16.1**	**14.7**	**27.4**	**15.1**	**15.2**	**13.7**	**14.77**	**15.5**	**13.4**	**14.6**

Figures

FIGURE 1



LEGEND

- MONITORING WELL LOCATION (SAMPLE AND HYDRAULIC)
- MONITORING WELL LOCATION (HYDRAULIC)
- USG EXTRACTION WELL LOCATION
- EXISTING IRM TREATMENT BUILDING
- EXISTING IRM PIPING (UNTREATED)
- EXISTING IRM PIPING (TREATED)

GE AVIATION
EVENDALE, OHIO

SITE MAP WITH SELECTED MONITORING WELLS

N

0 200 400 800
Feet

612-60834
APRIL 2015

O'BRIEN & GERE

Figure 2
AF-11S & D Nested Series Pilot Test Hydrograph
GE Aviation
Evendale, OH

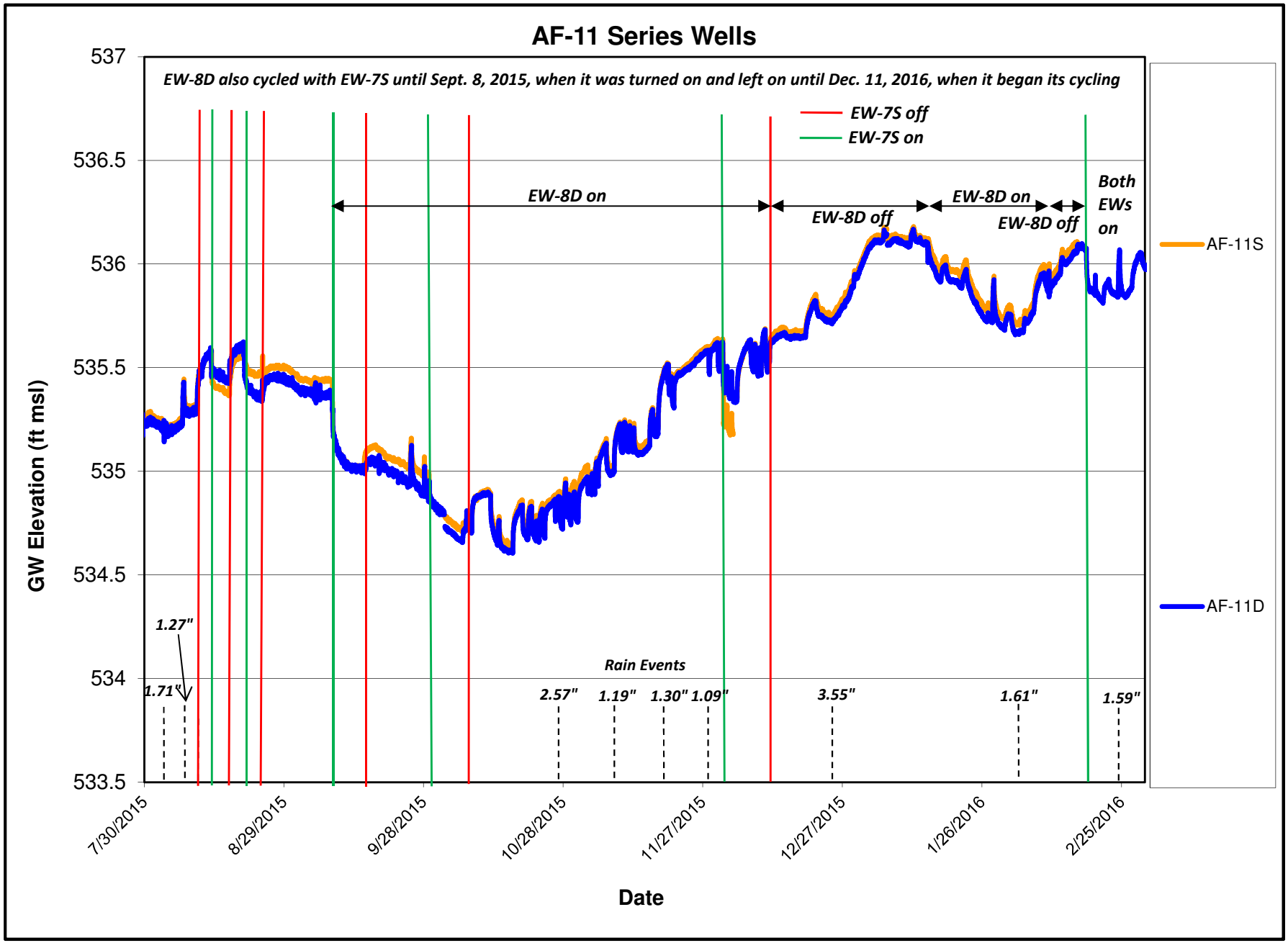


Figure 3
OSMW-4S & D Nested Series Pilot Test Hydrograph
GE Aviation
Evendale, OH

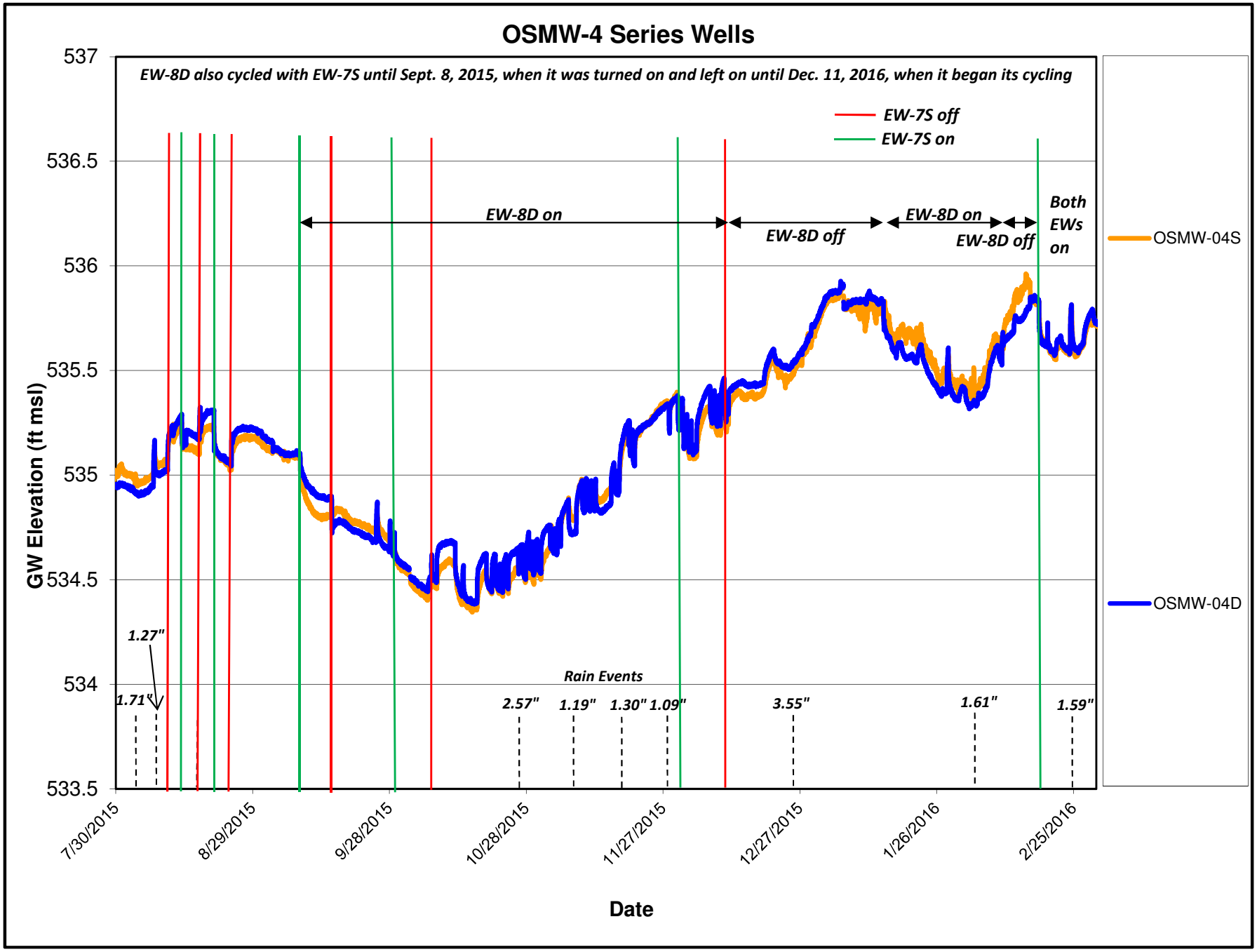


Figure 4
AF-11S Pilot Test Analytical Results
GE Aviation
Evendale, OH

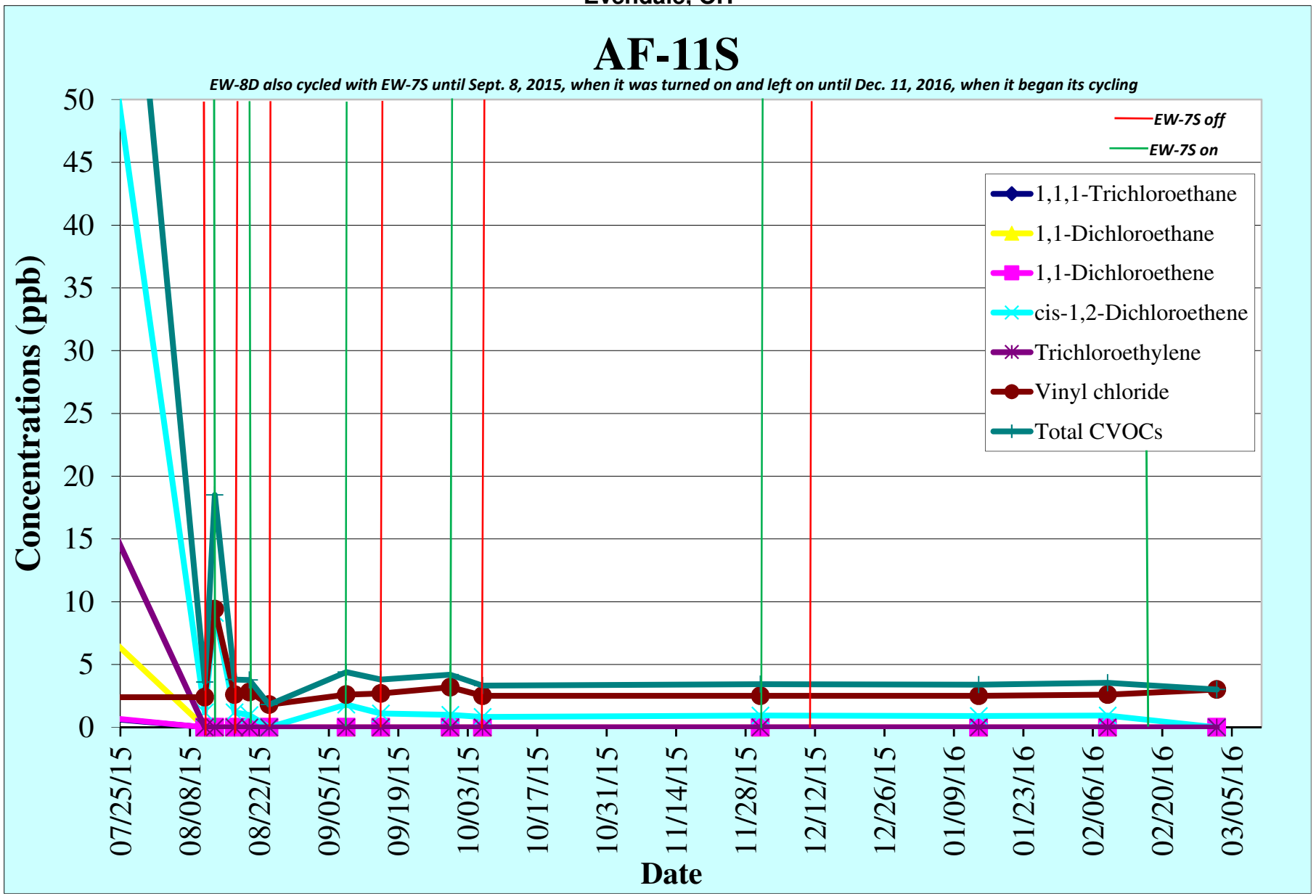


Figure 5
OSMW-4S Pilot Test Analytical Results
GE Aviation
Evendale, OH

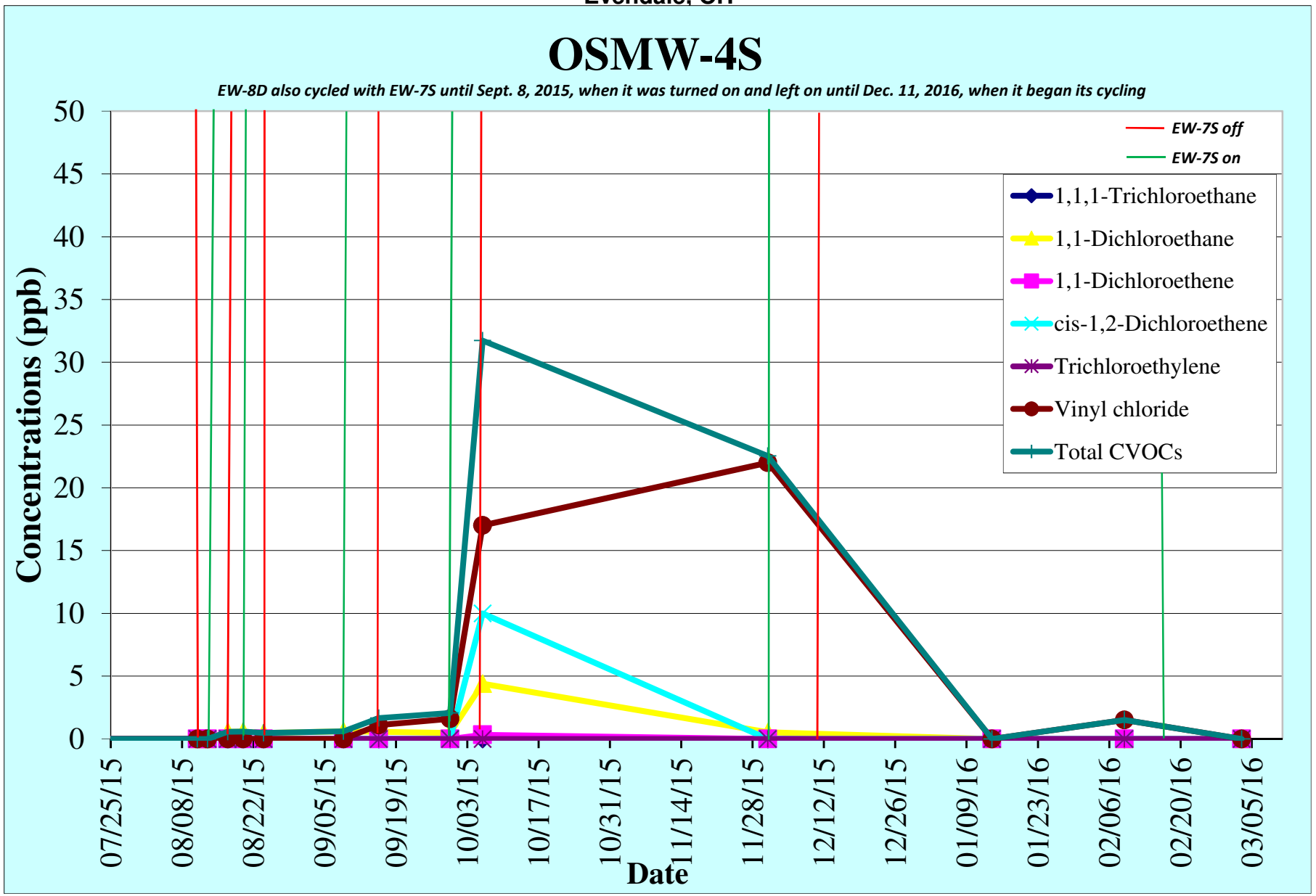


Figure 6
EW-7S Pilot Test Analytical Results
GE Aviation
Evendale, OH

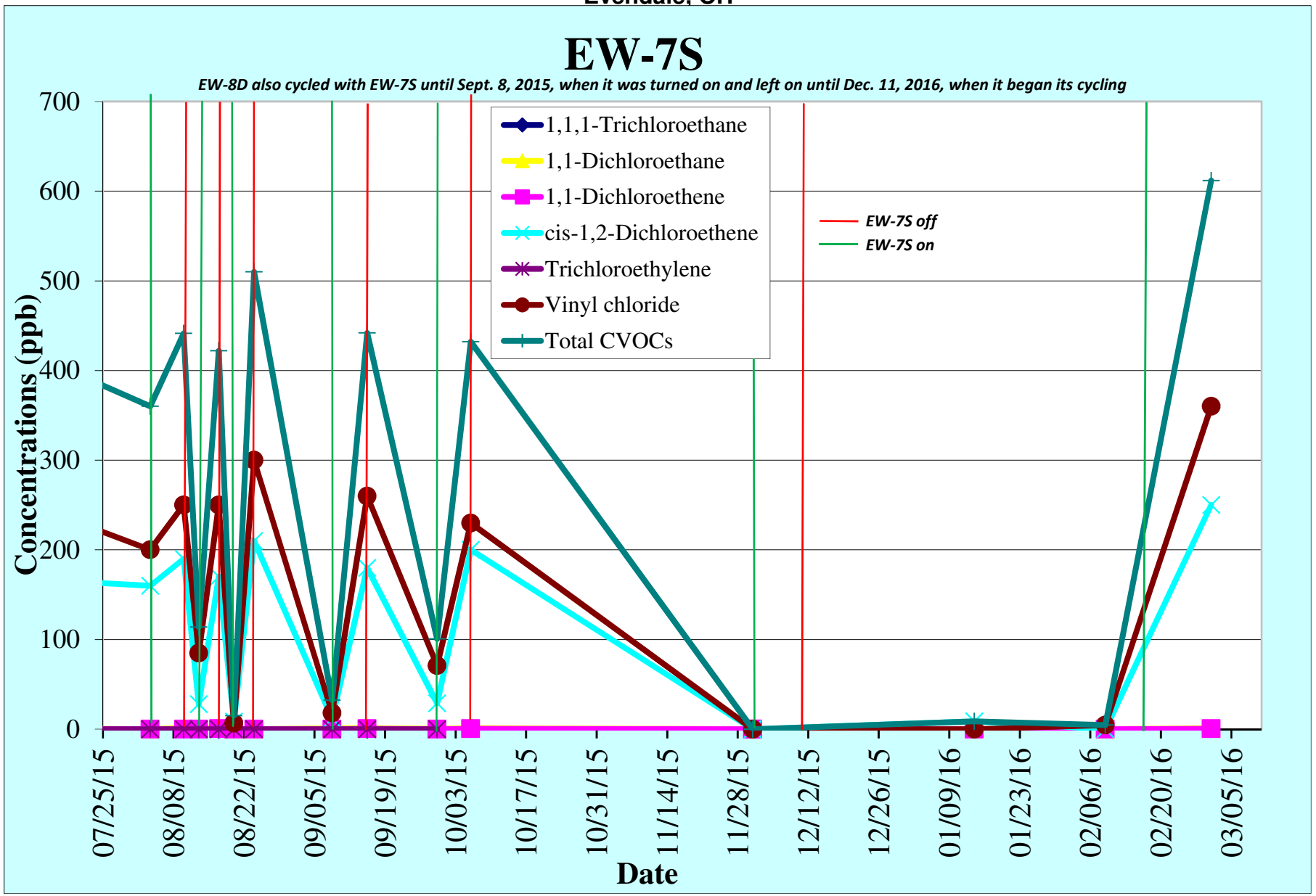


Figure 7
AF-11D Pilot Test Analytical Results
GE Aviation
Evendale, OH

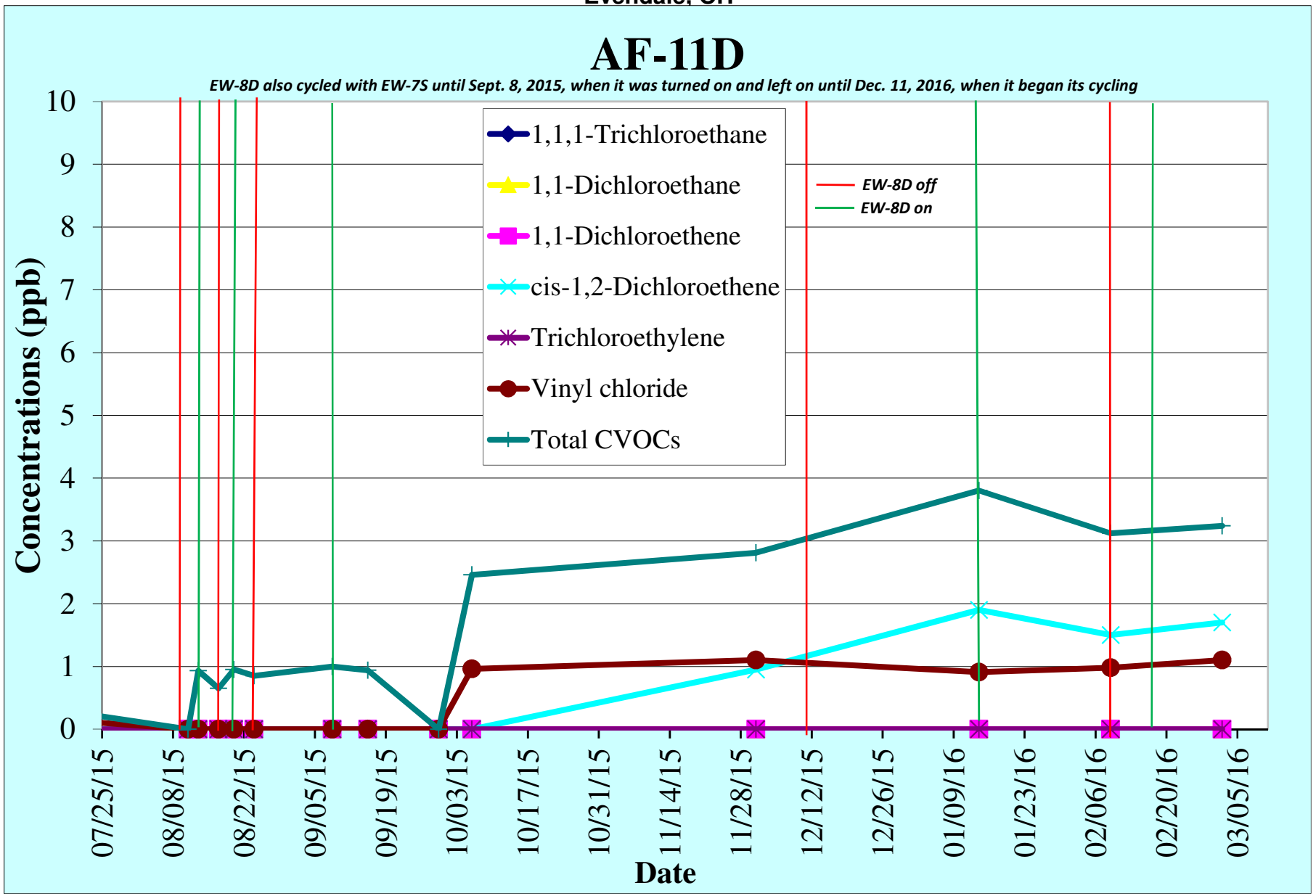


Figure 8
OSMW-4D Pilot Test Analytical Results
GE Aviation
Evendale, OH

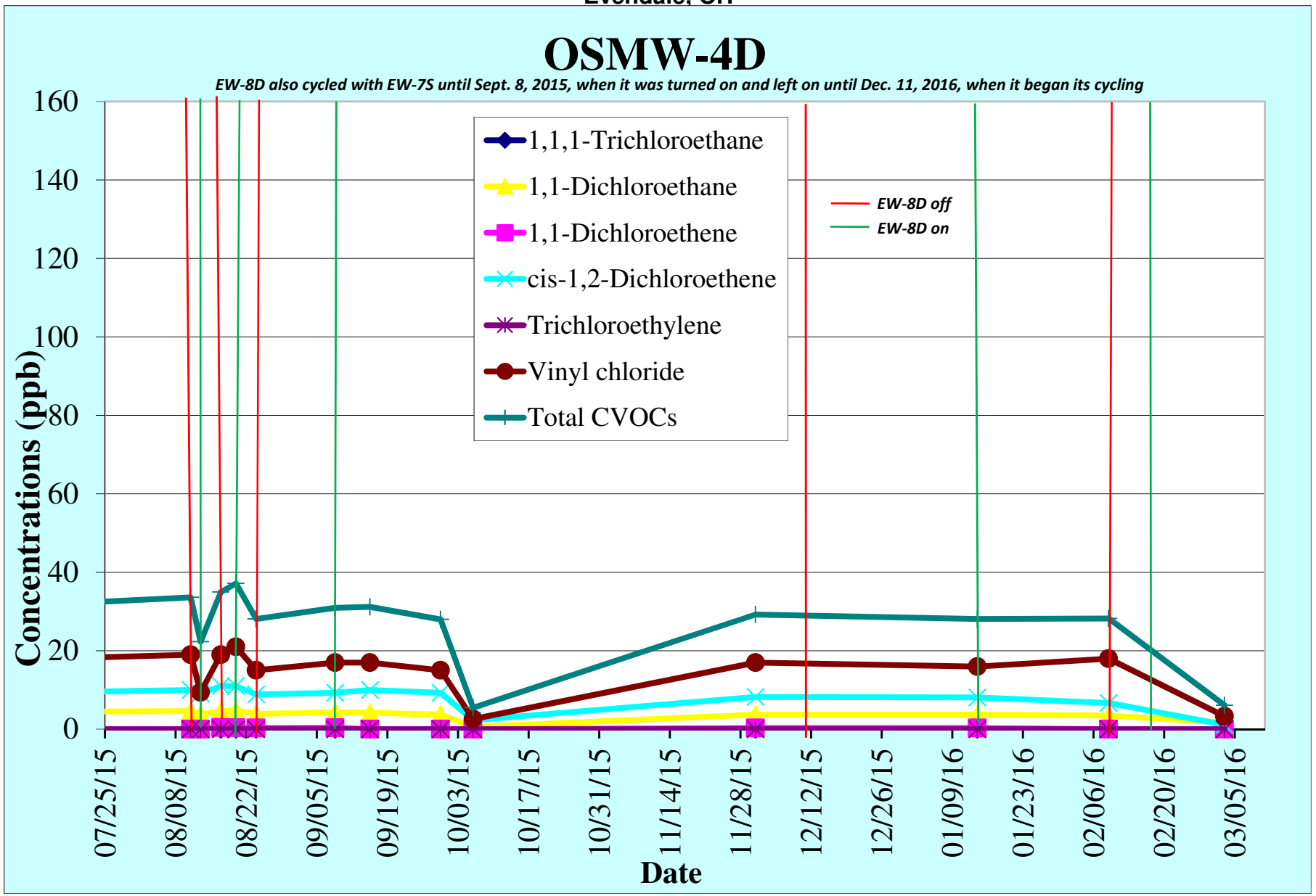
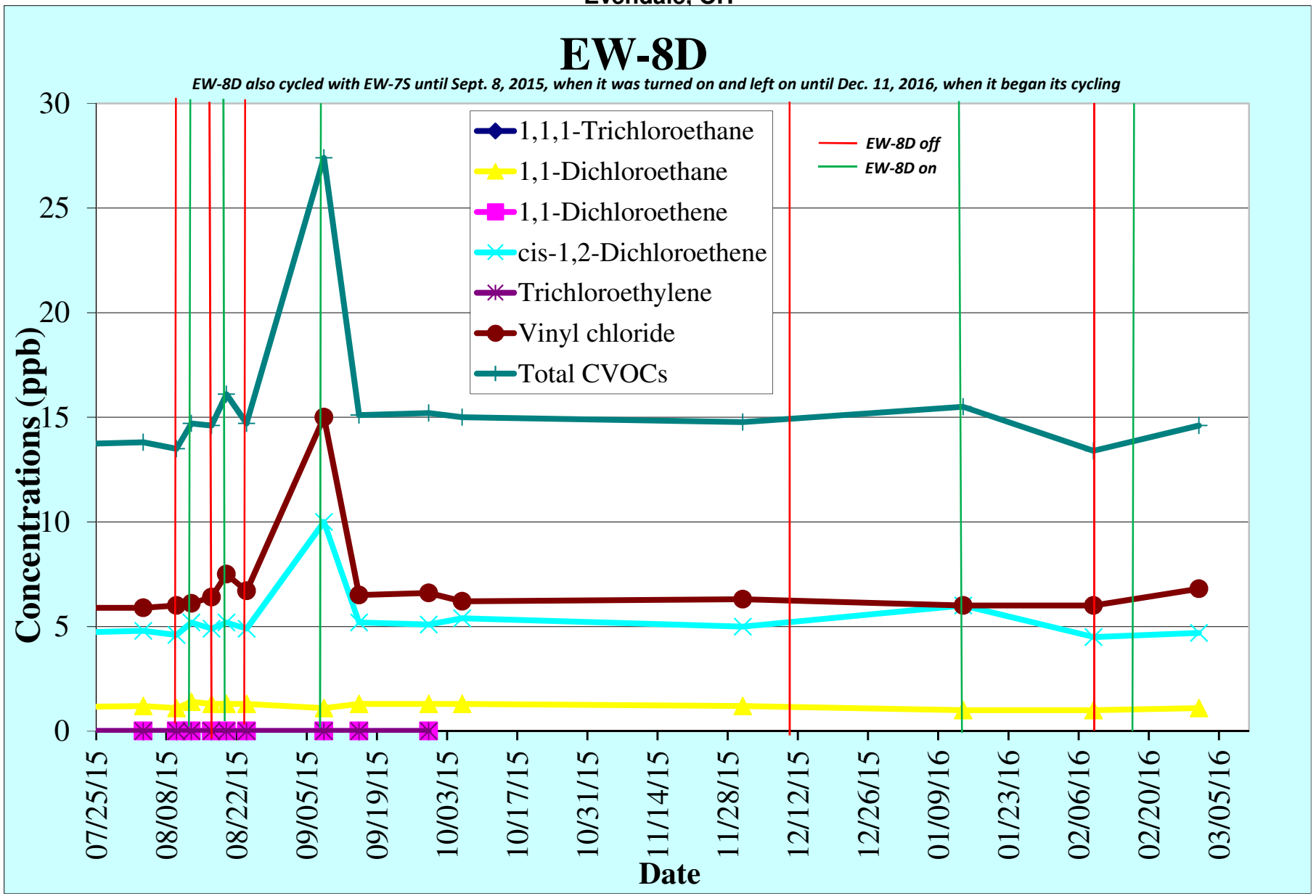
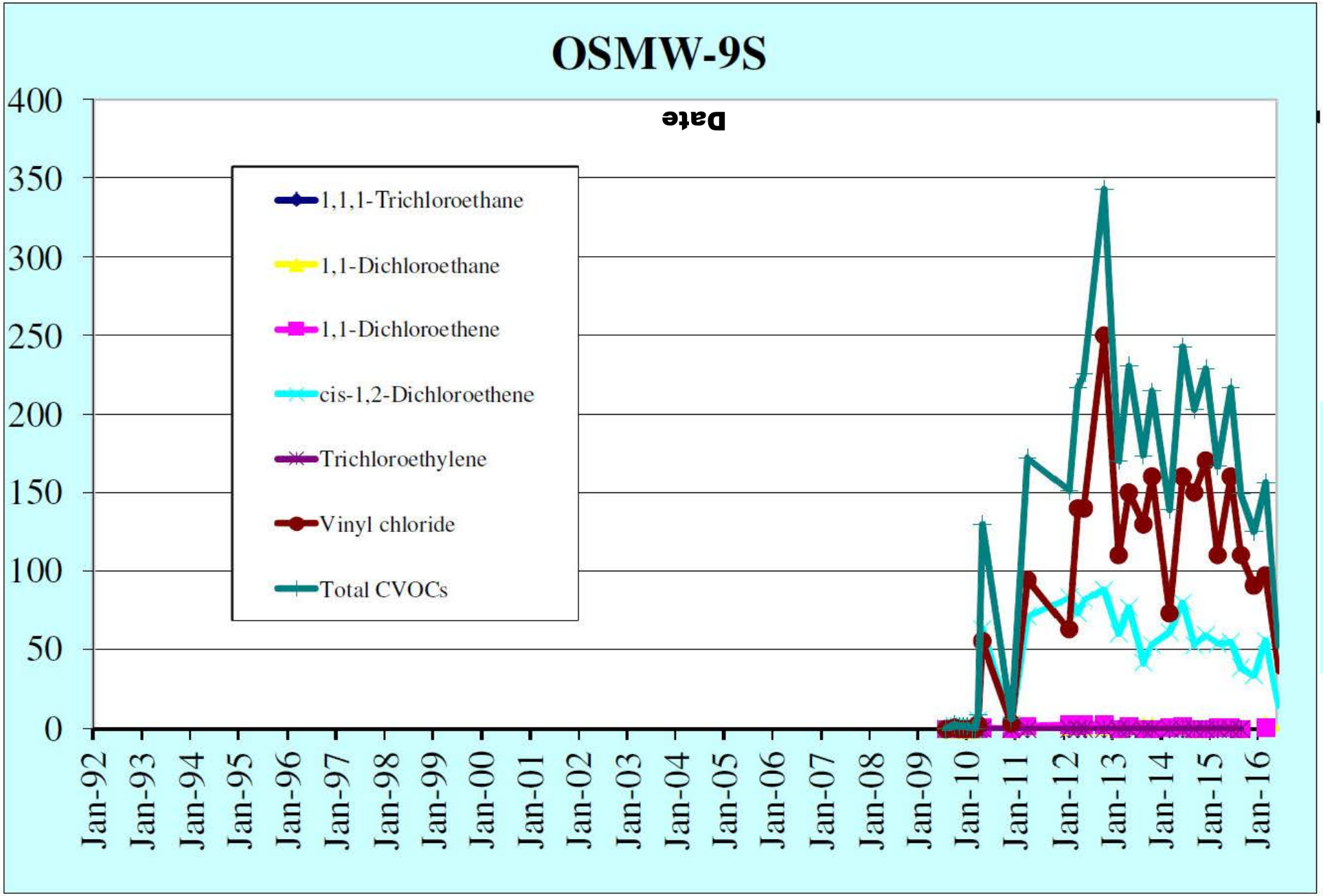


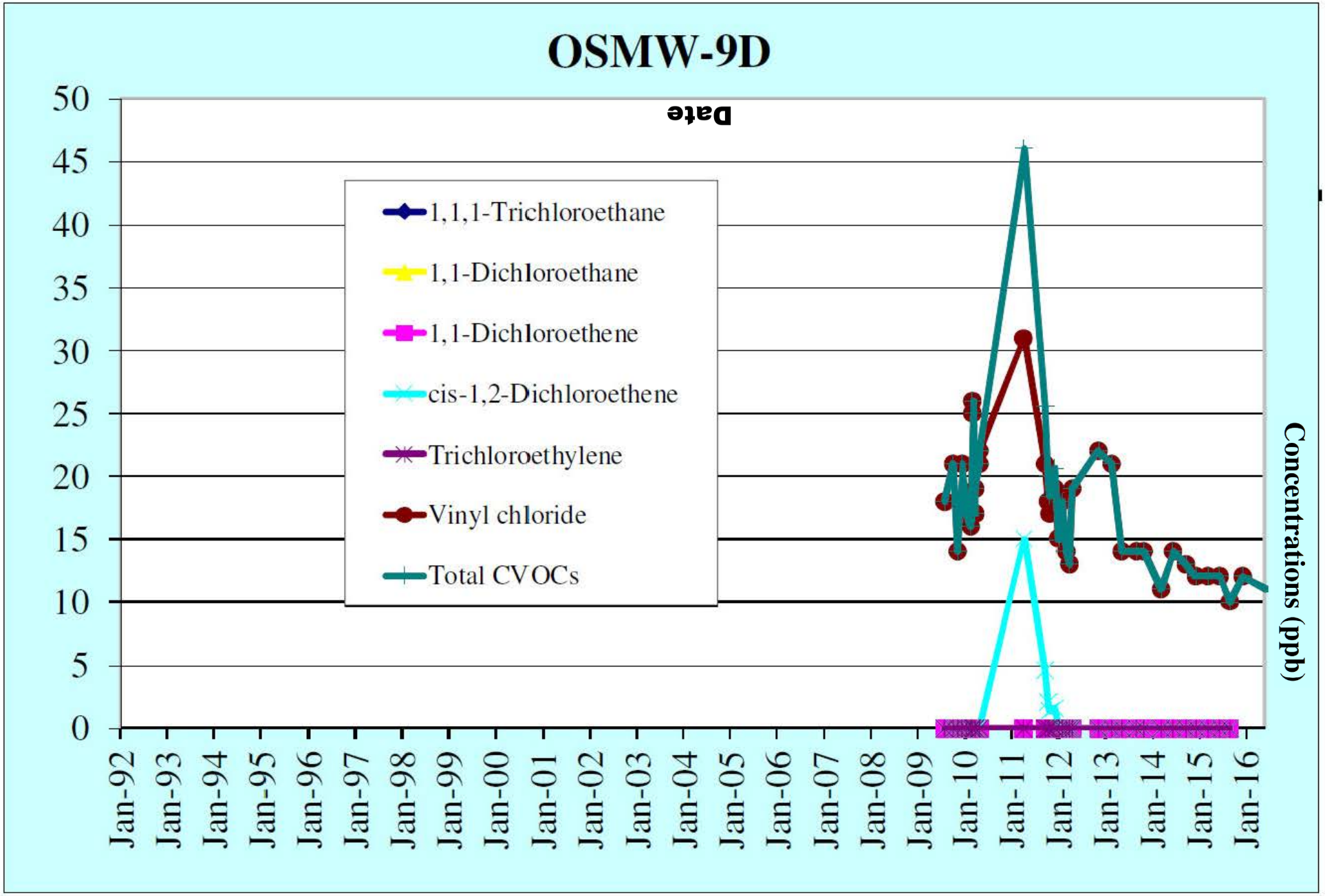
Figure 9
EW-8D Pilot Test Analytical Results
GE Aviation
Evendale, OH



Appendices

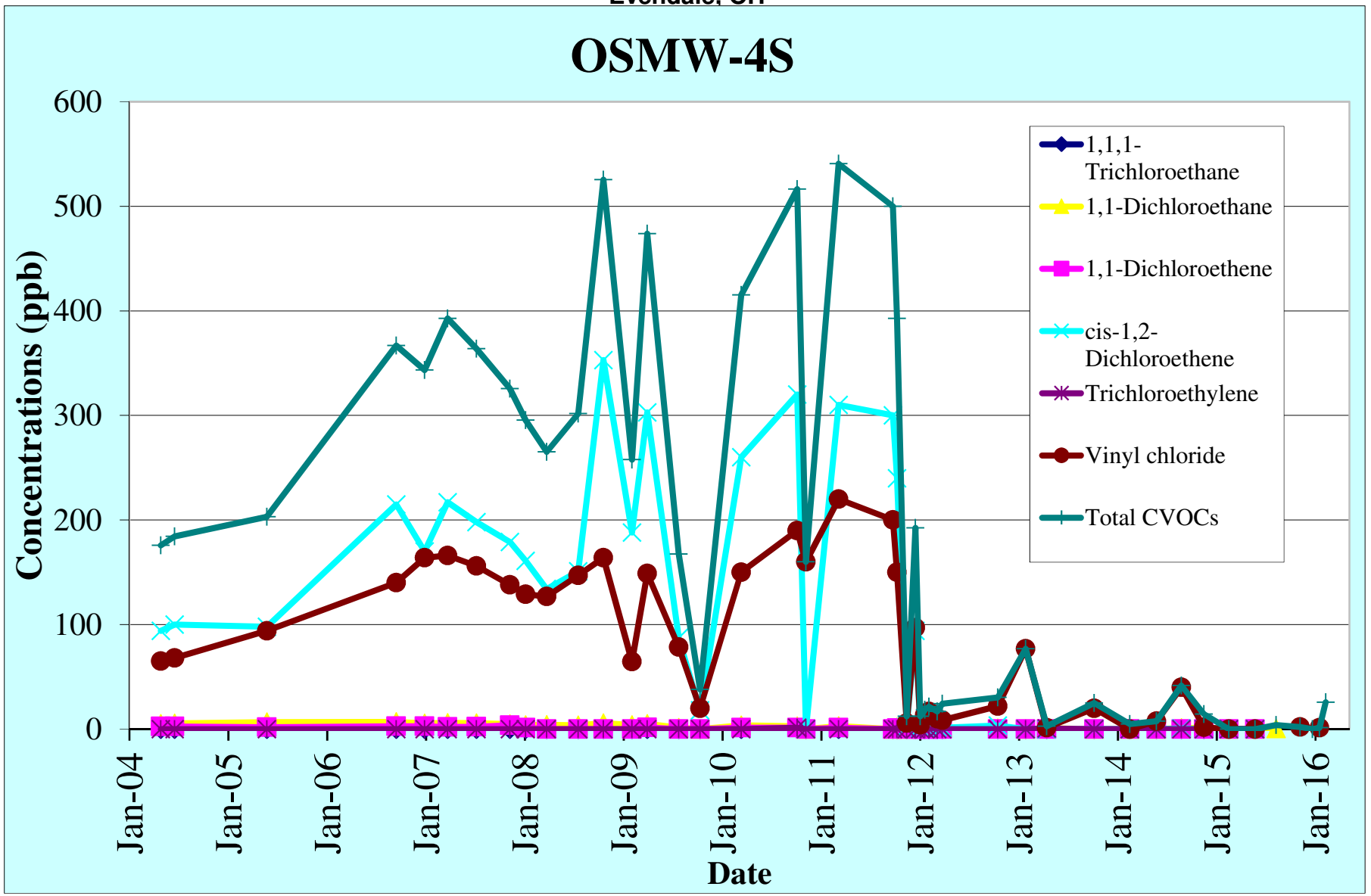
Appendix A – AF-9S & D Historical Groundwater Analytical Results


OSMW-9S
Date
Concentrations (ppb)
1,1,1-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
Trichloroethylene
Vinyl chloride
Total CVOCs
400
350
300
250
200
150
100
50
0
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16


OSMW-9D
Date
Concentrations (ppb)
1,1,1-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
Trichloroethylene
Vinyl chloride
Total CVOCs
50
45
40
35
30
25
20
15
10
5
0
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16

Appendix B – OSMW-4S Historical Groundwater Analytical Results

Figure B-1
OSMW-4S Historical Analytical Results
GE Aviation
Evendale, OH



OBG

THERE'S A WAY